Remarks

Claims 1-6, 10, and 15-29 are in the application. Reconsideration and withdrawal of the rejections is requested in view of the foregoing amendments and the following remarks.

Claim 1 has been amended to describe a work-in-progress space, as described at page 3, line 20, and page 9, line 4, rather than an indexer.

Claim 22 is allowed.

Claims 1, 18 and 21 have been amended to describe a pod door remover, or door removal means, for removing a door from the pod, FOUP, or workpiece container, as described at page 39, lines 13-20. Claims 1, 18 and 23 have also been amended to describe a spray or spin/spray process chamber, as described at page 37, lines 6-10. Claims 1 and 23 have been further amended to describe the transfer station positioned at least partially over the work-in-progress or indexer space, as shown in Figs. 33 and 34. These changes have been made to further distinguish over the prior art. New claims 24-29 have been added.

Dependent claims 2, 4, 6 and 10 have been amended to remain consistent with claim 1. Claim 9 has been cancelled as redundant of amended claim 1.

Semiconductor manufacturing is performed in a clean room. As is well known, construction, operation and maintenance of clean room space can be complex, time-consuming, and expensive. Accordingly, it is highly advantageous to minimize the space requirement or "footprint" of semiconductor manufacturing equipment, while still providing high manufacturing throughput. As described in the specification, e.g., at pages 4 and 44, the claimed system provides high productivity with a compact footprint,

in several ways. As shown in Figures 33 and 34, by placing the work-in-progress space or indexer vertically below the docking station 828 and the transfer station 830, the footprint of the overall system 52 is reduced, while all functions are retained. In addition, protection against contamination is preserved because the workpieces remain sealed within the boxes or FOUPs 815, while at the lower elevation of the system, where risk of contamination is higher. The workpieces are only exposed to the environment when they are moved into the process section via the docking station 828, while at the higher elevation, where risk of contamination is less.

Turning now to the prior art and the final rejection of claims 1, 9 and 23, Williams *et al.*, U.S. Patent No. 6,030,208 describes a thermal processor. Regardless of other factors, Williams *et al.* does not disclose a spray process chamber. Accordingly, claims 1 and 23 cannot be anticipated by Williams *et al.* under Section 102(a). In addition, Williams *et al.* is not prior art under Section 102(e)/103, because Williams *et al.* and the present application are commonly owned.

Turning to the rejections of claims 1-3, 15-18 and 23, at paragraph 3 of the 02/03/2003 office action, Fisher Jr., U.S. Patent No. 4,701,096, describes a Ferris wheel assembly 117 for lifting carriers 50 from an input queue and transporting them in a circular manner to a vertical transfer subassembly 150. The wafer handling station is used for loading the furnace 12 shown in Fig. 1. As the wafers are provided in open carriers 50, there is no suggestion of, or reason to have, a docking station, or a container door remover at the docking station, as claimed.

Turning to the rejections at paragraph 4 of the 02/03/2003 office action, Sakamoto *et al.* describes a system for loading printed circuit boards. As noted by the

Examiner, Sakamoto *et al.* discloses upper and lower conveyor units 6B and 6A, in Fig. 3, which load magazines of printed circuit boards into upper and lower tiers as shown therein, for example, in Figs. 14 and 20. Sakamoto *et al.* does not suggest a docking station and container door remover, as described in the amended and new claims. In addition, Sakamoto *et al.* does not describe a spray process chamber.

Turning to the rejections at paragraph 5 of the 02/03/2003 office action, Matsushima, U.S. Patent No. 5,947,675 relates to a cassette transfer mechanism for transferring a cassette between stand-by and transfer positions. Column 1, lines 4-9. The transfer mechanism is used with a cluster tool as shown in Fig. 12 therein. Column 1, lines 34-40. Referring to Fig. 1 of Matsushima, all of the cassettes are at the same horizontal level, since Fig. 1 (as well as Fig. 8) are plan or top views. The vertical or height dimension in Matsushima is designated by Z, as shown in Fig. 12, while the X and Y directions are horizontal directions. In contrast to the pending claims, Matsushima does not suggest a docking station, or the concept of docking a container, and removing a door of a container to provide access to the wafers inside. Contrary to the Examiner's observation at the top of page 4 of the 02/03/2003 office action, the upper portion of the chamber 21, adjacent to the outlet port 24, does not suggest a docking station. Rather, the cited features are simply "upper portions of the chambers 21." They are not identified or otherwise described in Matsushima. Contrary to the pending claims, Matsushima also does not suggest a door remover.

Davis *et al.*, U.S. Patent No. 5,664,337, describes a processing system where the work-in-progress or storage/holding area is adjacent the top of the machine. See Fig. 2. There are no elements above the storage/holding area (on the carousel

assembly 720). In contrast, the pending claims describe an indexer or a work-in-progress space located under a docking station or a transfer station. Davis *et al.* also discloses only operation with wafers provided in open cassettes 79. Consequently, Davis *et al.* does not suggest a docking station, or a container door remover, as claimed.

In view of the foregoing, it is submitted that the claims are in condition for allowance, and a Notice of Allowance is requested.

Respectfully submitted,
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Claim Sheet Marked Up To Show Changes

1. (Presently Amended) A system for processing flat media, comprising:

~~an indexer~~ a work-in-progress space at a first elevation and having multiple positions for holding batches of flat media;

a docking station at a second elevation higher than the first elevation;

a container door remover at the docking station;

an elevator for vertically raising a ~~pod containing~~ container holding flat media from the first elevation to the docking station;

a transfer station ~~adjacent to the docking station~~;

a spray process ~~station~~ chamber; and

a process robot movable between the transfer station and the process ~~station~~ chamber, for moving flat media between them.

2. (Presently Amended) The system of claim 1 further including an indexer in the work-in-progress space and a loader associated with the indexer, the loader having a load elevator for moving a closed ~~pod of~~ container holding flat media between an up position, and a down position, and with the load elevator in the down position substantially aligned with the indexer at the first elevation.

3. (Presently Amended) The system of claim 2 with the loader having a loader conveyor for moving a ~~pod~~ container holding flat media from the loader onto the indexer.

4. (Presently Amended) The system of claim ~~1~~ 2 with the indexer comprising at least one drive section having a plurality of rollers for supporting a ~~pod~~ flat media holding container, and with a drive motor linked to at least one of the rollers.

5. (Presently Amended) The system of claim 4 where the rollers support the ~~pod~~ container only at the outside lateral edges of the ~~pod~~ container.

6. (Presently Amended) The system of claim 1 further including an indexer in the work-in-progress space, where the indexer comprises a first row and second row parallel to the first row, and at least one shuttle device for moving a ~~pod~~ container from the first row to the second row.

9. (Presently Cancelled)

10. (Presently Amended) The system of claim ~~2 with the loader~~ 1 further comprising a ~~pod~~ container rotator at the first elevation.

15. (Original) The system of claim 1 further comprising at least one transfer robot at the transfer station.

16. (Presently Amended) The system of claim 15 further comprising at least one carrier at the transfer station, with the transfer robot movable to carry a flat media article from a ~~pod~~ container at the docking station to a carrier at the transfer station.

17. (Original) The system of claim 16 with the at least one carrier further comprising spaced apart finger slots adapted to engage with an end effector on the process robot.

18. (Presently Amended) A system for processing flat media, comprising:

an indexer;

a transfer station above the indexer;

a docking station adjacent to the transfer station;

a container door remover associated with the docking station;

a spray process ~~station~~ chamber;

a process robot movable between the transfer station and the process ~~station~~ chamber, for moving flat media between them; and

at least one docking station elevator for moving a ~~pod~~ container vertically from the indexer to the docking station.

19. (Original) The system of claim 18 further comprising an engager plate positioned on an engager actuator supported on the docking station elevator.

20. (Presently Amended) The system of claim 19 further comprising a docking wall at the docking station with the docking wall having at least one opening, and with the engager plate moveable towards and away from the docking wall, to dock and un-dock a ~~pod~~ container at the docking station.

21. (Previously Amended) The system of claim 18 further comprising a generally horizontal deck separating the indexer from the transfer station.

22. (Presently Amended) A system for processing flat media, comprising:

an indexer having a first row and second row parallel to the first row, with each of the first and second rows having a plurality of ~~pod~~ container holding positions, and at least one shuttle device for moving a ~~pod~~ container from the first row to the second row;

a docking ~~station~~ wall having ~~first and second pod docking positions~~ at least one opening, for docking a container;

at least one ~~a first docking station~~ elevator associated with the ~~first row of the~~ indexer, for moving a ~~pod~~ container vertically between the ~~first row of the~~ indexer and the docking ~~station~~ wall;

~~a second docking station elevator associated with the second row of the indexer, for moving a pod vertically between the second row of the indexer and the docking station;~~

a transfer ~~station~~ robot positioned vertically above the indexer and adjacent to the docking ~~station~~ wall, ~~a transfer station robot in the transfer station, and at least one carrier loading position in the transfer station,~~ with the transfer ~~station~~ robot moveable to carry a flat media article from a ~~pod~~ container at the docking ~~station~~ wall to a carrier ~~at the transfer station~~;

at least one spray process ~~station~~ chamber;

a process robot having an end effector for engaging and lifting the carrier ~~at the transfer station and movable between the transfer station and~~ and for moving the carrier to the process chamber ~~station, for moving flat articles between them~~.

23. (Presently Amended) A system for processing flat media, comprising:

means for ~~indexing a pod~~ holding a container at a first elevation;

a docking station for docking the ~~pod~~ container at a second elevation higher than the first elevation;

door removal means for removing a door of the container;

means for raising the pod from the first elevation to the docking station;

a transfer station adjacent to the docking station;

means for carrying flat media from the ~~pod~~ container at the docking station to the transfer station;

means for spin/spray processing the flat media; and

means for moving the flat media between the transfer station and the means for processing the flat media.

24. (New) A system for processing flat workpieces, comprising:

a work-in-progress space at a first elevation, and having multiple positions for holding containers of workpieces waiting to be processed;

a container docking ~~station~~ wall at a second elevation higher than the first elevation;

an elevator for vertically raising a container holding flat media from the first elevation to the docking ~~station~~ wall;

a transfer ~~station~~ robot located vertically over the work-in-progress space;

a spin/spray process chamber; and

a process robot movable between the transfer ~~station~~ robot and the process chamber, for moving flat media between them.

25. (New) The system of claim 1 with the process robot including:

a lift unit;

a vertical lift rail on the lift unit;

an elbow joint on the lift unit, with the elbow joint moveable along the lift rail via a lift motor;

a forearm attached to the lift unit at the elbow joint;

a wrist joint attached to the forearm; and

an end effector attached to the forearm at the wrist joint.

26. (New) The system of claim 25 wherein the wrist joint is laterally offset from the forearm for holding articles to one side of the forearm, with the process robot

moveable into an overhand position wherein the wrist joint is above the elbow joint, and moveable into an underhand position wherein the wrist joint is below the elbow joint.

27. (New) The system of claim 25 wherein the end effector is displaced to one side of the wrist joint and the elbow joint, so that neither the wrist joint or the elbow joint is positionable vertically above the end effector, regardless of the orientation of the process robot.

28. (New) The system of claim 1 with the docking station including a docking wall having at least one opening to allow movement of flat media between a container at the docking station and the transfer station.

29. (New) The system of claim 28 further including a transfer station robot at the transfer station, with the transfer station robot extendible into a container at the docking station for removing flat media from the container for processing.